



Milind Diwan <milind.diwan@gmail.com>

Check again

9 messages

Milind Diwan <diwan@bnl.gov>**Mon, Feb 18, 2008 at 4:07 PM**

Reply-To: diwan@bnl.gov

To: Kenneth Lande <klande@physics.upenn.edu>, Laurie Littenberg <litt@bnl.gov>, Kevin Lesko <ktlesko@lbl.gov>, Mark Dierckxsens <mdier@hep.uchicago.edu>, Mary Bishai <mbishai@bnl.gov>, Steve Kettell <kettell@bnl.gov>

Please check my talk for inaccuracies.

It has been scrubbed twice now. Should be O.K.

--

regards,
Milind Diwan, Ph.D.



SLAC-p5-meeting.pdf
1642K

Mary Bishai <mbishai@bnl.gov>**Mon, Feb 18, 2008 at 5:33 PM**

To: Milind Diwan <diwan@bnl.gov>

Hi Milind,

Why are you using the old 28 GeV disappearance plot for your cover page?
The WBLE disappearance plots are available at

http://www.phy.bnl.gov/~bishai/nwg/work/rates/plots/png/h_wble120_disap_1300_0.png
http://www.phy.bnl.gov/~bishai/nwg/work/rates/plots/png/h_wble060_disap_1300_0.png

These are just rates using total CC of course. Or do you want the actual
QE cross-sections?

You can do an exposure of 0.5 MT and 2E7 seconds (1yr) and add a $\times 10^3$
on the plot to get the rates you want.

=====

Mary Bishai	Office: 3-181
Associate Physicist	Pager:
Brookhaven National Laboratory	Tel: 631-344-4877
Bldg 510E, P.O. Box 5000	FAX: 631-344-4741
Upton, NY 11973-5000	E-mail: mbishai@bnl.gov

=====

On Mon, 18 Feb 2008, Milind Diwan wrote:

> Please check my talk for inaccuracies.
>
> It has been scrubbed twice now. Should be O.K.
>
> --
> regards,
> Milind Diwan, Ph.D.
>

Mary Bishai <mbishai@bnl.gov>**Mon, Feb 18, 2008 at 5:49 PM**To: Milind Diwan <diwan@bnl.gov>Cc: Kenneth Lande <klande@physics.upenn.edu>, Laurie Littenberg <litt@bnl.gov>, Kevin Lesko <ktlesko@lbl.gov>, Mark Dierckxsens <mdier@hep.uchicago.edu>, Mary Bishai <mbishai@bnl.gov>, Steve Kettell <kettell@bnl.gov>

Somewhere on your slides you should again emphasize that the CPV asymmetry is inversely proportional to θ_{13} => always need big detector. Perhaps on pg5 with the bubble plots?

-pg 6: I am pretty sure we used $2.5E-3 \text{ eV}^2$ not 2.7(Mark?). Also shouldn't this exposure be 120 e20 POT? Its 2MW.

-Pg 9 : Something aint scaling: From page 6 we get 800 events/(2MW, 300kT, 3 yrs) -> expect 160events/(1.2MW, 100kT, 3 yrs). Why is it 210?

-Pg 11: Is it really θ_{13} at 3sigma but mass hierarchy at 2 sigma? You should make that difference clearer.

=====

Mary Bishai	Office: 3-181
Associate Physicist	Pager:
Brookhaven National Laboratory	Tel: 631-344-4877
Bldg 510E, P.O. Box 5000	FAX: 631-344-4741
Upton, NY 11973-5000	E-mail: mbishai@bnl.gov

=====

On Mon, 18 Feb 2008, Milind Diwan wrote:

> Please check my talk for inaccuracies.
>
> It has been scrubbed twice now. Should be O.K.
>
> --
> regards,
> Milind Diwan, Ph.D.
>

Kevin Lesko <ktlesko@lbl.gov>**Mon, Feb 18, 2008 at 6:42 PM**To: Diwan Milind <diwan@bnl.gov>Cc: Kevin Lesko <ktlesko@lbl.gov>, Kenneth Lande <klande@physics.upenn.edu>, Laurie Littenberg <litt@bnl.gov>, Mark Dierckxsens <mdier@hep.uchicago.edu>, Mary Bishai <mbishai@bnl.gov>, Steve Kettell <kettell@bnl.gov>

Milind,
you should have in your backup slides a comparison of NOvA to 100kt WCh.

slide 4: CW - perhaps we should be careful in the language, spell things out, don't want the committee to spend time wondering, say it for them.

slide 6: polarity - same comment, you've got space say neutrinos and antineutrinos
move "2" next to the "MW"

slide 8: SuperNova --> Supernovae

slide 9: polarity thing again
move "2" next to the "MW"

slide 10: Reach with 100kt **Water Cherenkov**

slide 11: These are linear plots of slide 10, right? but at 2 sigma. ok, these are the nova comparisons, how about having an overlay with NOvA ready, just in case.

slide 15: units missing on electronics 10.65M

slide 16: ok, the only thing I found that was missing was rock disposal - could just be a conveyer to the open cut, but is ~ \$9M.

slide 18: could be ready in mid decade (2015) for **physics**
unique physics capability in the world.
get started on much larger facility (->program) for CP violation.
subsequent (rather than later caverns) cavities
spell out scintillator,

Kevin

On Feb 18, 2008, at 1:07 PM, Milind Diwan wrote:

Please check my talk for inaccuracies.

It has been scrubbed twice now. Should be O.K.

--

regards,
Milind Diwan, Ph.D.<SLAC-p5-meeting.pdf>

Kevin T. Lesko
Institute for Nuclear and Particle Astrophysics Tel: (510) 486-7731
Lawrence Berkeley National Laboratory FAX: (510) 486-6738
1 Cyclotron Road, MS 50R5008 <http://ktlesko.lbl.gov>
Berkeley, CA 94720-8158, USA

Mark Dierckxsens <mdier@hep.uchicago.edu>

Mon, Feb 18, 2008 at 7:03 PM

To: Mary Bishai <mbishai@bnl.gov>

Cc: Milind Diwan <diwan@bnl.gov>, Kenneth Lande <klande@physics.upenn.edu>, Laurie Littenberg <llitt@bnl.gov>, Kevin Lesko <ktlesko@lbl.gov>, Steve Kettell <kettell@bnl.gov>

> -pg 6: I am pretty sure we used $2.5E-3 \text{ eV}^2$ not $2.7(\text{Mark?})$.
We used $2.7e-3 \text{ eV}^2$ as agreed upon for the FNAL-BNL study (read: as was dictated by the goddess of fermilab).

> Also shouldnt
> this exposure be 120 e20 POT? Its 2MW.

>
These are the spectra using a 120 GeV beam. I'll make the 120e20 pot plots for the 60 GeV beam. They'll be on the website in ~30 mins (i.e. 19:30 EST).

> -Pg 9 : Something aint scaling: From page 6 we get 800 events/(2MW. 300kT, 3 yrs) -> expect 160events/(1.2MW, 100kT, 3 yrs). Why is it 210?

>
Related to previous point. The signal event rates for the 60 GeV beam are higher than the 120 GeV 0.5 degrees off axis beam for the same beam power, but the S/\sqrt{B} is roughly the same.

Mark

> -Pg 11: Is it really theta13 at 3sigma but mass hierarchy at 2 sigma? You should make that difference clearer.

>
> =====
> Mary Bishai Office: 3-181
> Associate Physicist Pager:
> Brookhaven National Laboratory Tel: 631-344-4877
> Bldg 510E, P.O. Box 5000 FAX: 631-344-4741
> Upton, NY 11973-5000 E-mail: mbishai@bnl.gov
> =====

> On Mon, 18 Feb 2008, Milind Diwan wrote:

>
>
>> Please check my talk for inaccuracies.
>>
>> It has been scrubbed twice now. Should be O.K.
>>
>> --
>> regards,
>> Milind Diwan, Ph.D.
>>
>>

Kevin Lesko <KTLesko@lbl.gov>

Mon, Feb 18, 2008 at 7:30 PM

To: Kevin Lesko <KTLesko@lbl.gov>

Cc: Diwan Milind <diwan@bnl.gov>, Kenneth Lande <klande@physics.upenn.edu>, Laurie Littenberg <litt@bnl.gov>, Mark Dierckxsens <mdier@hep.uchicago.edu>, Mary Bishai <mbishai@bnl.gov>, Steve Kettell <kettell@bnl.gov>

btw,
nice talk!
KTL

On Feb 18, 2008, at 3:42 PM, Kevin Lesko wrote:

Milind,
you should have in your backup slides a comparison of NOvA to 100kt WCh.

slide 4: CW - perhaps we should be careful in the language, spell things out, don't want the committee to spend time wondering, say it for them.

slide 6: polarity - same comment, you've got space say neutrinos and antineutrinos
move "2" next to the "MW"

slide 8: SuperNova --> Supernovae

slide 9: polarity thing again
move "2" next to the "MW"

slide 10: Reach with 100kt **Water Cherenkov**

slide 11: These are linear plots of slide 10, right? but at 2 sigma. ok, these are the nova comparisons, how about having an overlay with NOvA ready, just in case.

slide 15: units missing on electronics 10.65M

slide 16: ok, the only thing I found that was missing was rock disposal - could just be a conveyor to the open cut, but is ~ \$9M.

slide 18: could be ready in mid decade (2015) for **physics**
unique physics capability in the world.
get started on much larger facility (->program) for CP violation.
subsequent (rather than later caverns) cavities
spell out scintillator,

Kevin

On Feb 18, 2008, at 1:07 PM, Milind Diwan wrote:

Please check my talk for inaccuracies.

It has been scrubbed twice now. Should be O.K.

--

regards,
Milind Diwan, Ph.D.<SLAC-p5-meeting.pdf>

Kevin T. Lesko
Institute for Nuclear and Particle Astrophysics
Lawrence Berkeley National Laboratory
1 Cyclotron Road, MS 50R5008
Berkeley, CA 94720-8158, USA

KTLesko@lbl.gov
Tel: (510) 486-7731
FAX: (510) 486-6738
<http://ktlesko.lbl.gov>

Kevin T. Lesko
Institute for Nuclear and Particle Astrophysics Tel: (510) 486-7731
Lawrence Berkeley National Laboratory FAX: (510) 486-6738
1 Cyclotron Road, MS 50R5008 <http://ktlesko.lbl.gov>
Berkeley, CA 94720-8158, USA

Littenberg <litt@bnl.gov>
To: Milind Diwan <diwan@bnl.gov>

Tue, Feb 19, 2008 at 9:33 AM

Milind,

There are a lot of things that need to be fixed in this presentation. Let's get together ASAP.

Regards,
Laur

On Mon, 18 Feb 2008, Milind Diwan wrote:

> Please check my talk for inaccuracies.
>
> It has been scrubbed twice now. Should be O.K.
>
> --
> regards,
> Milind Diwan, Ph.D.
>

Littenberg <litt@bnl.gov>
To: Milind Diwan <diwan@bnl.gov>

Tue, Feb 19, 2008 at 5:52 PM

Milind,

I didn't realize you wouldn't be in today. I'll try to put as much as I can in email and be as clear as possible.

I think there are some real problems with your slides although the basic story is very good. I showed the talk to Howard and he agreed, and some of the specific comments below are his. The problems are mostly in presentation and I hope you can fix them in time.

One category is inconsistency of numbers and it is pretty bad. On page 1 you claim to be showing a graph for a 300KT detector with 1MW of beam. Before discussing whether the numbers and graphs are consistent or correct, I have to ask why you pick this case which doesn't correspond to any of the others discussed in the talk?

Then there are the numbers. You claim 100,000 CC events/year but the plot you give doesn't appear to support this. It's not immediately

obvious because the plot doesn't correspond to the case (it's a 500 KT detector rather than 300 KT). The plot claims it is for $5e7$ sec - how many years is that supposed to be? If I take $2e7$ sec/year, which I guess is conceivable for Fermilab, and scale to your case with $300KT \cdot 2e7s / (500KT \cdot 5e7s)$, I get a factor 0.24. The plot claims a total of 51,500 events for no oscillations. Therefore one year for a 300KT detector would give 12,360 events, about a factor 8 less than you claim! Did you slip a 0?

Later you show two sets of signal plots that are supposed to be for the ultimate and intermediate cases. According to your slides the two cases have the same beam power (2 MW) but differ by a factor 3 in detector mass, so the numbers of events should be different by a factor 3. Yet the corresponding numbers of signal events are different by factors between 4 and 5. Your audience is very likely to pick up on this! If you are too sloppy about numbers, the audience are liable to use this to calibrate you. Another point - the exposure here is given in PoT. If I take this to be for 3 years, it gives $2 \cdot 10^{21}$ /year. If I take a cycle time of 1.4sec and 170TP/cycle, this gives about $1.65e7$ seconds per year. This would make the disagreement of the first slide and plot a little worse! You should get command of all these numbers. I just remember when Stan Wojcicki utterly savaged the KOPIO TDR for inconsistencies that were far less serious.

Finally on the intermediate slide simulated signal slide there's a "Total rate of events $\sim 30k/yr$ ". This is inconsistent with what you have on the first page either the 100,000 (which would imply 67,000) or my corrected 12,000 (which would imply 8,000 for this case).

Also there's a bad font which gives your number 1's the appearance of capital I's.

Other points

1. The collaboration list on page 2 is out of date (Mary's not on it, etc.)

2. Second bullet of the Scientific strategy slide - what does "CW" mean? Also you should be sure to say a few words about the matter effect - not everyone on the Panel is an expert. Finally, wouldn't it be better to say "An experimental set up with a large matter effect, such as one gets with a 1300km baseline, is more sensitive to possible new physics."

3. The Technical Issue slide should have the word "DUSEL" somewhere on it. Also is the second bullet referring to NOvA? You may want to be explicit about this. Also you may want to have a conclusion bullet pointing out what a great result these plots imply. However I'm worried again about numerical consistency - the plots on this page refer to $120+120 \cdot 10^{20}$ PoT, twice as much as on the following page which refers to 3 years. This implies 6 years each for neutrino and anti-neutrino running. Do you really want to advertize this?

4. On the following slide (which should be labeled "Ultimate Reach"), your last bullet is "[background] Should be better with higher PMT count". Can you quantify this?

5. The Intermediate proposal slide at the end of the first bullet, you

should say what the previous experiments give confidence of - is it that a 100 IKT detector can be built? how well it will work? or ?

6. On the second bullit you end with "FNAL beam appears feasible" What is the point? Would anyone doubt Fermilab could build such a beam?

7. Your Megaton Modular ... slide will take a while to get through if you actually want them to understand it. There should be scales on it to indicate the size.

8. On your schedule slide the Site setup line starts this year. Is this being paid for by South Dakota? If not, how? It seems very aggressive.

9. For the cost slides, Howard claims Baltay wants all numbers in FY08 dollars. Do they need to be converted? Also, it's a little odd to separate out the one-time costs the way you have. Perhaps you should make a 2 or 3-row table at the top of the first cost slide entitled "one-time costs". Then put your present table underneath it and title it "Incremental cost for each 100KT detector". Then the table on the second cost slide would be 2 or 3 rows shorter.

10. Note that your backup cost slide is not obviously consistent with the tables in the previous cost slides. You have \$33.3M for the total chamber cost - how does that square with the \$28.1M? Etc. It may be better not to give them the backup. If you do, you should explain the apparent discrepancies Also, where you write "to be funded", perhaps you should write "requesting funding".

11. On the second backup slide, you have a lot of typos. E.g. "Sissor" instead of "Scissor".

Regards,
Laur

On Mon, 18 Feb 2008, Milind Diwan wrote:

> Please check my talk for inaccuracies.
>
> It has been scrubbed twice now. Should be O.K.
>
> --
> regards,
> Milind Diwan, Ph.D.
>

Milind Diwan <diwan@bnl.gov>
Reply-To: diwan@bnl.gov
To: Littenberg <litt@bnl.gov>

Wed, Feb 20, 2008 at 3:52 AM

Laurie:

There are quite a few misunderstandings in your comments, but that is also important because obviously we have failed to remove them even locally.

I have attached a new version to take care of your comments and others.
I will go through all your comments below.

=====

- > I think there are some real problems with your slides although the
- > basic story is very good. I showed the talk to Howard and he agreed, and
- > some of the specific comments below are his. The problems are mostly in
- > presentation and I hope you can fix them in time.
- >
- > One category is inconsistency of numbers and it is pretty bad. On
- > page 1 you claim to be showing a graph for a 300KT detector with 1MW of
- > beam. Before discussing whether the numbers and graphs are consistent or
- > correct, I have to ask why you pick this case which doesn't correspond to
- > any of the others discussed in the talk?
- > Then there are the numbers. You claim 100,000 CC events/year but
- > the plot you give doesn't appear to support this. It's not immediately
- > obvious because the plot doesn't correspond to the case (it's a 500 KT
- > detector rather than 300 KT). The plot claims it is for $5e7$ sec - how
- > many years is that supposed to be? If I take $2e7$ sec/year, which I guess
- > is conceivable for Fermilab, and scale to your case with
- > $300KT \cdot 2e7s / (500KT \cdot 5e7s)$, I get a factor 0.24. The plot claims a total of
- > 51,500 events for no oscillations. Therefore one year for a 300KT
- > detector would give 12,360 events, about a factor 8 less than you claim!
- > Did you slip a 0?

The total number of events includes everything: deep inelastic scattering, neutral currents, so on. For the disappearance analysis we make harsh cuts to keep only clean well-measured events.

Total number of events is well understood and extremely well scrubbed by Mary and Mark. It is correct.

To remove any arguments about the plot (which is also correct), I have removed it and replaced it with Mary's simple spectrum plot with no cuts.

The plot is important because people don't appreciate what a huge effect we are looking at.

- > Later you show two sets of signal plots that are supposed to be
- > for the ultimate and intermediate cases. According to your slides the two
- > cases have the same beam power (2 MW) but differ by a factor 3 in detector
- > mass, so the numbers of events should be different by a factor 3. Yet the
- > corresponding numbers of signal events are different by factors between 4
- > and 5.

The second 2 mw was a typo. It is corrected.

Your audience is very likely to pick up on this! If you are too sloppy about numbers, the audience are liable to use this to calibrate

- > you. Another point - the exposure here is given in PoT. If I take this
- > to be for 3 years, it gives 2×10^{21} /year. If I take a cycle time of
- > 1.4sec and 170TP/cycle, this gives about 1.65×10^7 seconds per year. This
- > would make the disagreement of the first slide and plot a little worse!
- > You should get command of all these numbers. I just remember when Stan
- > Wojcicki utterly savaged the KOPIO TDR for inconsistencies that were far
- > less serious.

We are using 2×10^7 seconds/yr as agreed to in the FNAL/BNL study. The inconsistencies were because we used a spectrum from 120 GeV for the first and 60 GeV for the second. This has been fixed. The plots were correct.

60 e20 POT for 120 GeV is equal to 120×10^{20} POT for 60 GeV.

- > Finally on the intermediate slide simulated signal slide there's a
- > "Total rate of events ~ 30 k/yr". This is inconsistent with what you have
- > on the first page either the 100,000 (which would imply 67,000) or my
- > corrected 12,000 (which would imply 8,000 for this case).
- > Also there's a bad font which gives your number 1's the appearance
- > of capital I's.

300 kT at 2 MW gives $\sim 200,000$ events per yr \Rightarrow 100kT at 1 MW gives ~ 30 k per yr.

- >
- > Other points
- > 1. The collaboration list on page 2 is out of date (Mary's not on it,
- > etc.)

I corrected the slide. It should say this is the author list of the proposal.

It is tough to make a new collaboration list right now: do I include Hank Sobel who is on P5 ?

In fact, I was trying to avoid a list, but then that looks like there is nobody backing this.

- >
- > 2. Second bullet of the Scientific strategy slide - what does "CW" mean?
- > Also you should be sure to say a few words about the matter effect - not
- > everyone on the Panel is an expert. Finally, wouldn't it be better to
- > say "An experimental set up with a large matter effect, such as one gets
- > with a 1300km baseline, is more sensitive to possible new physics."

CW: conventional wisdom. Every theorist worth his name has told me that I am betraying the cause of physics by giving up on BNL to Homestake. They would much rather have 2500 km because it is better physics.

- >
- > 3. The Technical Issue slide should have the word "DUSEL" somewhere on
- > it. Also is the second bullet referring to NOvA? You may want to be
- > explicit about this. Also you may want to have a conclusion bullet

- > pointing out what a great result these plots imply. However I'm worried
- > again about numerical consistency - the plots on this page refer to
- > $120+120 \cdot 10^{20}$ PoT, twice as much as on the following page which refers to
- > 3 years. This implies 6 years each for neutrino and anti-neutrino
- > running. Do you really want to advertize this?

$$\text{POT} (10^{20}) = 1000 * \text{Power (MW)} * \text{Time}(10^7 \text{sec}) / (1.6 * E_{\text{proton}}(\text{GeV}))$$

For 60 GeV $\Rightarrow 2 \cdot 10^7$ sec and 2 MW $\Rightarrow 40 \cdot 10^{20}$ POT per year.

We are using 60 GeV throughout now. Your initial confusion was due to the spectrum plot being from 120 GeV protons.

All our intensity and running assumption are same as NOVA and they cannot do CP violation.

If one wants to claim to be doing CP violation there is no option. The 2 MW proton driver has no better justification.

- >
- > 4. On the following slide (which should be labeled "Ultimate Reach"), your
- > last bullet is "[background] Should be better with higher PMT count". Can
- > you quantify this?

Yes, we can, but it is too much detail, I dropped it.

- >
- > 5. The Intermediate proposal slide at the end of the first bullet, you
- > should say what the previous experiments give confidence of - is it
- > that a 100 IKT detector can be built? how well it will work? or ?

> Feasibility and Performance. Both. The study used SuperK pattern recognition to suppress background. The suppression was checked against SuperK atmospheric data.

- > 6. On the second bullit you end with "FNAL beam appears feasible" What is
- > the point? Would anyone doubt Fermilab could build such a beam?
- >

The issue is always can FNAL really build this beam. But I dropped it.

- > 7. Your Megaton Modular ... slide will take a while to get through if you
- > actually want them to understand it. There should be scales on it to
- > indicate the size.

Kevin will show it also. This is becoming the iconic slide for Homestake. I put some dimensions on this. The engineer who did this for us has also done the rest of the Homestake plan. This is the total plan for DUSEL.

- >
- > 8. On your schedule slide the Site setup line starts this year. Is this

> being paid for by South Dakota? If not, how? It seems very aggressive.
>

I was asked to put the start of geotechnical work in the fall of 2008.

The actual cavern construction is more controversial. Kevin has placed it starting in 2012, but he has other constraints. I was told to put the technically possible schedule. Mark's schedule is even faster than mine.

> 9. For the cost slides, Howard claims Baltay wants all numbers in FY08
> dollars. Do they need to be converted? Also, it's a little odd to
> separate out the one-time costs the way you have. Perhaps you should make
> a 2 or 3-row table at the top of the first cost slide entitled "one-time
> costs". Then put your present table underneath it and title it
> "Incremental cost for each 100KT detector". Then the table on the second
> cost slide would be 2 or 3 rows shorter.

The one time costs are for 6 chambers. It is unfair to put that cost in for the first module. If we were only building the first module, we would do it differently.

I would rather keep them on separate pages.

As far as 2008 costs: we will have to live with 2007 costs for this talk. When I get back, perhaps we can talk about projectizing this stuff.

>
> 10. Note that your backup cost slide is not obviously consistent with the
> tables in the previous cost slides. You have \$33.3M for the total chamber
> cost - how does that square with the \$28.1M? Etc. It may be better not
> to give them the backup. If you do, you should explain the apparent
> discrepancies Also, where you write "to be funded", perhaps you should
> write "requesting funding".

I split the backup slide to show the 28.1M number which is only for 1 chamber and the one time cost of geotechnical and access drift work. I fixed the language.

- > 11. On the second backup slide, you have a lot of typos. E.g. "Sissor" instead of "Scissor".

> These are Mark Laurenti's slides. I will just leave it alone for now.

> Regards,
> Laur

> On Mon, 18 Feb 2008, Milind Diwan wrote:

>
>
> > Please check my talk for inaccuracies.
>>

> > It has been scrubbed twice now. Should be O.K.
> >
> > --
> > regards,
> > Milind Diwan, Ph.D.
> >
>

--
regards,
Milind Diwan, Ph.D.



SLAC-p5-meeting.pdf
1818K
